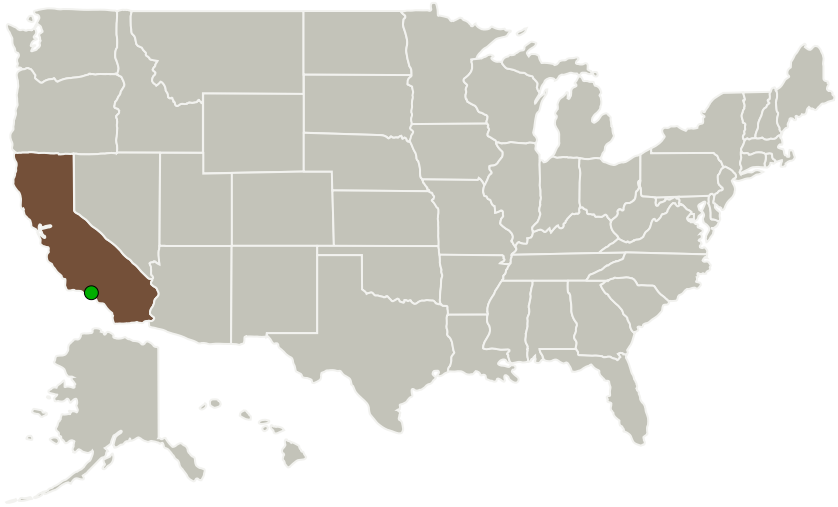
Low-Cost Beamforming SiGe MMIC Receivers at mm-Wave, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

The goal of this project is to perform technology research and development to integrate phase shifters and other needed electronics for electronically steered mmWave beamforming phased array Receivers at 35.6 GHz and 94 GHz so that the size of the Receiver package is commensurate with the antenna array. At these frequencies, the current state-of-the-art in technology for receiver or T/R module designs are not feasible. To achieve this goal, multiple array elements must be combined and processed into one integrated electronics package. The project will draw on NxGEN Electronics' high density/high frequency packaging and interconnect experience and Liner Signal's RFIC product baseline designs and their experience for low cost commercial satellite communications terminals. The design target is 16 phase shifters and supporting functionality, including low noise amplifiers, combiners, downconverters, and digital beamformer control logic integrated onto a single RFIC. The result will be unprecedented size reduction for phased array antennas at these frequencies. key aspects of the solution proposed is that the RFIC design will include ESD protection, package-ready impedance matching, and other enhancements needed to support a deployable, robust, mission-ready antenna system.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
NxGen Electronics, Inc.	Lead Organization	Industry	San Diego, California
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations
California

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140325)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

NxGen Electronics, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

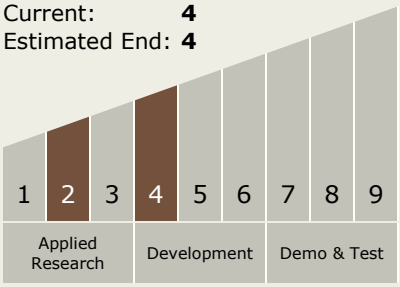
Carlos Torrez

Principal Investigator:

Don Hayashigawa

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.2 Radio Frequency
    - TX05.2.6 Innovative Antennas

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System